(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 662 191 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.11.2013 Bulletin 2013/46

(21) Application number: **12167635.7**

(22) Date of filing: **11.05.2012**

(51) Int Cl.:
B26F 1/44 *(2006.01)* ***B21D 28/16*** *(2006.01)*
B32B 7/12 *(2006.01)* ***H05K 3/46*** *(2006.01)*
G06K 19/077 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Oberthur Technologies**
92300 Levallois-Perret (FR)

(72) Inventors:
- **Huet, Mickael**
  c/o IP Département, Oberthur Technologies
  92000 Nanterre (FR)
- **Bosquet, Olivier**
  c/o IP Département, Oberthur Tsechnologies
  92000 Nanterre (FR)

(74) Representative: **Lefevre-Groboillot, David André et al**
Cabinet Beau de Loménie
158, rue de l'Université
75340 Paris Cedex 07 (FR)

(54) De-burring tool

(57) A de-burring tool shown generally as 1 in Figure 1 is formed of a punch 20 and a die 30. The punch has a cutting surface 21 and a shoulder 23 so that as the punch passes a primary surface 31 on the die a substrate is cut and any burs on the cut surface a removed by the shoulder 23 subsequently passing the primary surface 31.

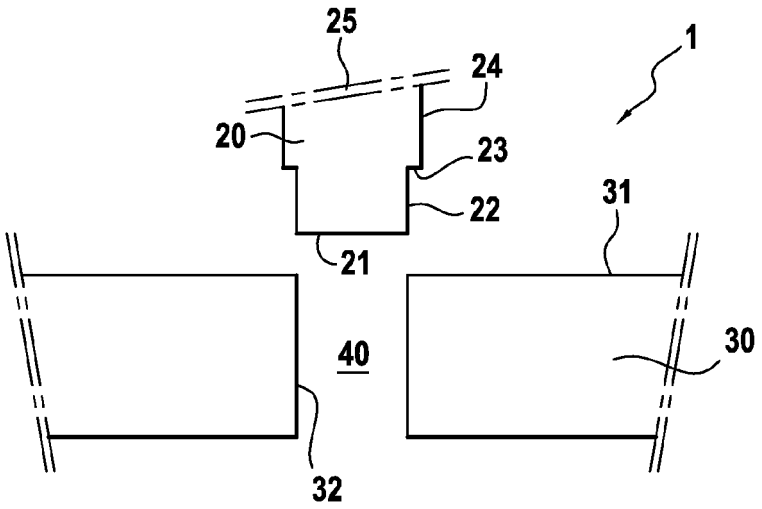


FIG.1

EP 2 662 191 A1

Description

Field of the Invention

[0001] The invention relates to a de-burring tool and in particular, but not exclusively, a tool for use in the manufacture of chip and/or magnetic stripe cards.

Background of the Invention

[0002] Data cards are of a generally rectangular shape, often with rounded corners and these cards are made using a pre-punching or cutting tool which scores or cuts out the outline of the shape of the card that is to be cut from a sheet of material. SIM cards are now often provided as a card that is held on a carrier card that is formed from a sheet of material with the SIM card being held within the body of the carrier card by connections between the SIM card and the carrier card. The SIM card when used by a user is pushed out of the carrier card, and the carrier card is then discarded. SIM cards can be made from a plastics based material or a paper based material and the process of making the cards is generally the same, using the same tool, except that different blades are used depending on the type of material to be cut.

[0003] To produce data carriers such as credit cards or SIM cards from a sheet of material it is necessary to have very accurate precutting or crushing of the card material so that the outline of the card is accurately marked out and there is a limitation in the burrs that are produced during forming an outline of the data carrier.

[0004] The present invention seeks to overcome the problems associated with the prior art by providing a de-burring tool and a method of manufacturing a card that avoid the problems associated with the prior art, which is the poor finishing of the edges of cards. In particular the present invention seeks to overcome problems associated with the prior art in that it allows for the manufacture of cards more quickly by avoiding the need for a separate finishing step.

Summary of the Invention

[0005] According to a first aspect of the invention there is provided de-burring tool provided as a punch and die that are moveable relative to one another during operation to cut a substrate,

characterized in that the punch has a cutting surface and at least one shearing surface provided as a shoulder on the punch behind the cutting surface, the die having at least one primary surface that the cutting surface of the punch first passes during operation, followed by the shoulder, so that burrs formed by passage of the cutting surface past the primary surface of the die are removed by passage of the shoulder past the die, thereby providing a clean surface on the substrate that has been cut by the punch.

[0006] Preferably the punch has a singular cutting surface with a shoulder on either side of the cutting surface for removal of burrs.

[0007] It is envisaged that the cutting surface of the punch is provided as a linear edge that is in substantially in the same plane as the primary surface of the die, when the punch and die meet.

[0008] It is envisaged that the die has a secondary surface substantially perpendicular to the primary surface which the cutting surface of the die passes followed by the shoulder.

[0009] Preferably there is a clearance between the cutting face of the punch and the secondary face of the die that is twice that of the distance between the shoulder of the punch and the secondary face of the die.

[0010] In a preferred arrangement there is a clearance between the cutting face and the secondary surface of 10 micrometers.

[0011] Preferably there is a clearance between a shoulder of the punch and the secondary surface of the die of 5 micrometers.

[0012] It is preferred that the die is provided as two members each having a primary surface, the members being separated by a space to receive the cutting surface of the punch.

[0013] In a first arrangement the die is provided as a two part die with the two members being held relative to one another in a chuck.

[0014] In a further arrangement the die is provided as a one part die with the two members being positioned at a predetermined distance from one another.

[0015] Preferably the substrate is a data carrier with a magnetic stripe or microchip.

[0016] It is envisaged that the substrate is a SIM card.

[0017] According to a second aspect of the invention there is provided a method of cutting a surface and de-burring of the cut surface in a single action whereby the punch and die are moved relative to one another during an operation to cut a substrate, **characterized in that** the cutting surface of the punch is caused to move past a primary surface on the die with the punch continuing to move past the primary surface so that a shoulder on the punch subsequently moves past the primary surface so that burrs formed by passage of the cutting surface past the primary surface of the die are removed by passage of the shoulder past the die, thereby providing a clean surface on the substrate that has been cut by the punch.

[0018] Preferably the punch and die move relative to one another in a vertical direction.

[0019] It is envisaged that the method is used to produce a data carrier and in particular a SIM card.

[0020] Preferably the method is used to remove burs from a plastic substrate and in particular a polycarbonate substrate.

Brief Description of the Figures

[0021] An embodiment of the invention will be described with reference to and as illustrated in the accompanying figures by way of example only, in which:

Figure 1 shows: a punch and die according to an embodiment of the invention; and

Figure 2 shows: a series of steps in the cutting and de-burring of a substrate.

Detailed Description of Embodiments of the Invention

[0022] **Figure 1** shows generally a de-burring tool as 1. The tool is formed of a punch 20 and a die 30. The punch is a generally rectilinear shape with a cutting face 21 at a first end of the punch and a second opposite end 25 of the punch being held in a chuck (not shown) that can move the punch back and forth relative to the die. The movement preferably is in a vertical direction but it may also move horizontally depending on the orientation of the substrate that is to be cut.

[0023] The cutting face is parallel to a primary surface 31 of the punch. Leading back from the cutting surface 21 is a first cutting edge 22 of the punch which leads to a shoulder 23. The shoulder extends outwardly from the first edge 22 and extending from the shoulder is a further cutting edge 24. This gives the punch a stepped profile. As shown in the figure the profiles of both sides of the punch are symmetrical but it could be that just one side of the punch is stepped or the profiles may be asymmetrical.

[0024] With respect to the die 30, as shown in the figure, the die is formed with a space (cavity) 40 which accommodates the punch as it moves towards the die and past the primary surface 31.

[0025] The sequence of events that are involved in a cutting action are shown in Figure 2 as steps a) to c). At the start of the sequence a) the substrate to be cut 50, such as a SIM card is positioned on the primary surface 31 of the die 30 and above this is the punch 20. As shown in b) the punch moves past the primary surface 31 and cuts the substrate and the cut out part falls away as 50a. The cutting surface 21 follows through until the shoulder 23 passes the primary surface and any rough edges that have been left on the substrate are removed from the substrate edge and fall away as debris 50c.

[0026] The distance between the first cutting edge 22 and the inner edge 32 of the die as shown in Figure 1 is greater than that between the further cutting edge 24 and the inner edge of the die 32. This means that any debris that may protrude from the substrate that has been cut and which extends from the substrate will be cleaned by the shoulder 23 rubbing past the primary surface and removing any burrs.

[0027] This cleaning process can be used with many types of cards, including SIM cards or cards having push out stickers for use in electronic devices such as mobile phones. In particular the process and apparatus can be used with cards having a polycarbonate structure and this material is particularly difficult to punch out cleanly. Other plastics that could form the card include Polyethylene terephthalate (PET), e.g. Polyethylene Terephthalate Glycol (PETg) or Polyethylene Terephthalate Film (PETf).

[0028] Typical clearances are 10 micrometers between the face 22 and the face 32. The clearance for the face 24 and the die 32 is 5 micrometers. If the die is formed of one piece or then these tolerances will be predefined. However it is conceivable that if a two part die is used then the two parts of the die can be moved back and forth to vary the tolerances, depending on the material that is being punched.

[0029] It is to be understood that the above embodiments have been provided only by way of exemplification of this invention, such as those detailed below, and that further modifications and improvements thereto, as would be apparent to persons skilled in the relevant art, are deemed to fall within the broad scope and ambit of the present invention described. Furthermore where individual embodiments are discussed, the invention is intended to cover combinations of those embodiments as well.

Claims

1. A de-burring tool (1) provided as a punch (20) and die (30) that are moveable relative to one another during operation to cut a substrate (50), **characterized in that** the punch has a cutting surface (21) and at least one shearing surface provided as a shoulder (23) on the punch behind the cutting surface, the die having at least one primary surface (31) that the cutting surface (21) of the punch first passes during operation, followed by the shoulder (23), so that burrs (50c) formed by passage of the cutting surface past the primary surface of the die are removed by passage of the shoulder past the die, thereby providing a clean surface on the substrate (50) that has been cut by the punch.

2. A de-burring tool according to claim 1 wherein the punch has a single cutting (21) surface with a shoulder (23) on either side of the cutting surface for removal of burrs.

3. A de-burring tool according to claim 1 or claim 2, wherein the cutting surface (21) of the punch is provided as a linear edge that is in substantially in the same plane as the primary surface (31) of the die, when the punch (20) and die (30) meet.

4. A de-burring tool according to any preceding claim

wherein the die has a secondary surface (32) substantially perpendicular to the primary surface (31) which the cutting surface (21) of the die passes followed by the shoulder (23) during operation of the de-burring tool.

5. A de-burring tool according to any preceding claim wherein there is a clearance between a first edge (22) of the cutting surface (21) of the punch and the secondary face (32) of the die that is twice that of the distance between the shoulder (23) of the punch and the secondary face (32) of the die.

6. A de-burring tool according to any preceding claim wherein the clearance between the first edge (22) and the secondary surface (32) of the die is 10 micrometers.

7. A de-burring tool according to any preceding claim wherein the clearance between an edge (24) of the shoulder (23) of the punch and the secondary surface of the die is 5 micrometers.

8. A de-burring tool according to any preceding claim wherein the die (30) is provided as two members each having a primary surface (32), the members being separated by a space (40) to receive the cutting surface (21) of the punch.

9. A de-burring tool according to any preceding claim, wherein the die (30) is provided as a two part die with the two members being held relative to one another in a chuck.

10. A de-burring tool according to any preceding claim wherein the die (30) is provided as a one part die with the two members being positioned at a predetermined distance from one another.

11. A de-burring tool according to any preceding claim wherein the substrate (50) is a data carrier with a magnetic stripe or microchip.

12. A de-burring tool according to claim 11, wherein the data carrier is an ID-1 card.

13. A method of cutting a substrate (50) and de-burring of the cut substrate in a single action whereby a punch (20) and die (30) are moved relative to one another during an operation to cut the substrate, **characterized in that** the cutting surface (21) of the punch is caused to move past a primary surface (31) on a die with the punch continuing to move past the primary surface into a space (40) associated with the die so that a shoulder (23) on the punch subsequently moves past the primary surface (31) so that burrs formed by passage of the cutting surface past the primary surface of the die are removed by passage of the shoulder past the die, thereby providing a clean surface on the substrate that has been cut by the punch.

14. A method according to claim 13, wherein the punch (20) and die (30) move relative to one another in a vertical direction.

15. A method according to any of claims 13 or 14, wherein the substrate is a plastic substrate.

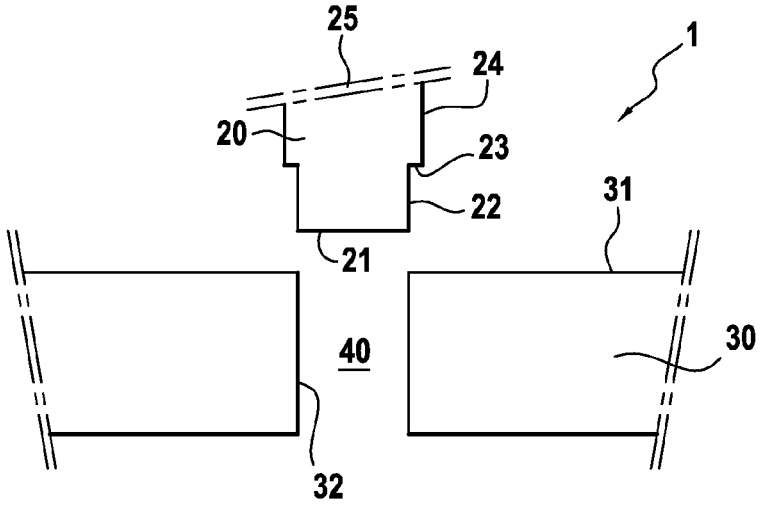
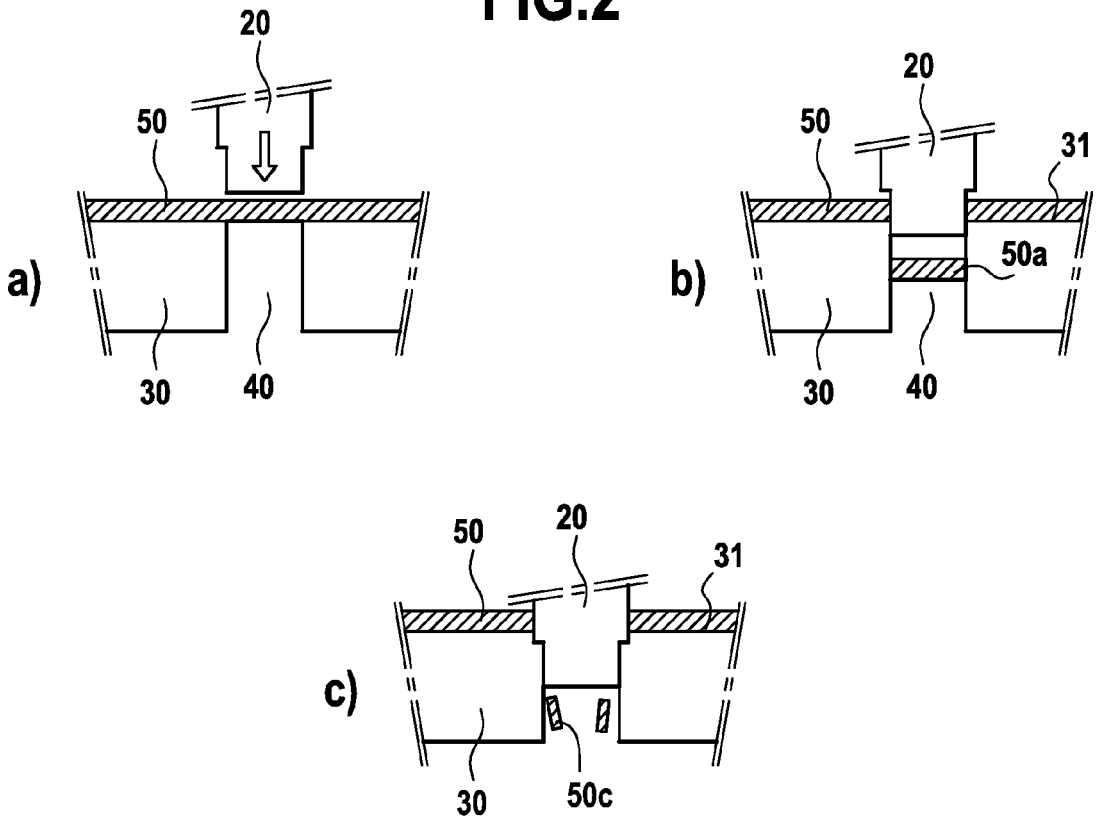

25
24
1
20
23
22
31
21
40
30
32

FIG.1

FIG.2


a)
20
50
30
40
b)
20
50
31
50a
30
40
c)
50
20
31
30
50c

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 16 7635

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	JP 2005 278316 A (MITSUBA CORP) 6 October 2005 (2005-10-06) * the whole document *	1-10,13, 14 15	INV. B26F1/44 B21D28/16 B32B7/12
X A	DE 199 48 857 A1 (VAW VER ALUMINIUM WERKE AG [DE]) 26 April 2001 (2001-04-26) * the whole document *	1-14 15	H05K3/46 G06K19/077
A	US 3 724 305 A (KONDO K) 3 April 1973 (1973-04-03) * the whole document *	1-15	
A	JP 8 099131 A (NIPPON STEEL CORP) 16 April 1996 (1996-04-16) * the whole document *	1-15	
A	US 2007/095176 A1 (GASSNER WOLFGANG [AT]) 3 May 2007 (2007-05-03) * abstract; figures *	1-15	
A	WO 01/88845 A1 (GIESECKE & DEVRIENT GMBH [DE]; DRESCHER GEORG [DE]) 22 November 2001 (2001-11-22) * pages 1-15 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) B26F B21D B32B H05K G06K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 October 2012	Canelas, Rui

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 16 7635

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-10-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2005278316 A	06-10-2005	NONE	
DE 19948857 A1	26-04-2001	NONE	
US 3724305 A	03-04-1973	BE 758810 A1	16-04-1971
		CH 538916 A	15-07-1973
		DE 2056828 A1	03-06-1971
		FR 2113796 A1	30-06-1972
		GB 1331645 A	26-09-1973
		JP 48044548 B	25-12-1973
		NL 7016784 A	18-05-1971
		SE 385792 B	26-07-1976
		US 3724305 A	03-04-1973
JP 8099131 A	16-04-1996	NONE	
US 2007095176 A1	03-05-2007	NONE	
WO 0188845 A1	22-11-2001	AT 420411 T	15-01-2009
		AU 6393001 A	26-11-2001
		CN 1429378 A	09-07-2003
		DE 10023801 A1	29-11-2001
		EP 1285405 A1	26-02-2003
		JP 2003533362 A	11-11-2003
		MX PA02011223 A	26-03-2004
		PL 199863 B1	28-11-2008
		US 2003159560 A1	28-08-2003
		WO 0188845 A1	22-11-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82